past, that the certain result of all meteoric coruscations and iridescences in the sky, is a fall of rain, snow or hail,—on this general principle, that the condensation of the crystalline particles of floating vapours which ensues upon electrical action, must be followed by precipitation; and these coruscations and iridescences are both the reflected evidences of such condensation of crystalline matter, and therefore the harbingers of such precipitation. It is the case with solar and lunar rainbows, falling stars, mock-suns, halos, lightning, aurora, and that undefined pearly lustre which sometimes appears in the neighbourhood of the sun.

"Accordingly, on the following morning, Saturday the 18th, I found the barometer had sunk considerably, and the wind had veered round from north-west to south-west, against the course of the sun, both in general, and especially when united, the forerunners of rain. Accordingly at 2 o'clock P.M. a smart shower came on in Northampton, but was of short duration. At 9 P.M. a heavier shower was experienced at Brixworth; and in the course of the night, but I cannot say at what hour, I was awakened to a still heavier shower; but the quantity of rain that had fallen did not seem to have affected the ground much on the following morning, and therefore I conclude that it was not great.

"Sunday the 19th was fine and bright; the wind went up to the westward, and the barometer rose rapidly—a general indication of an early change. Towards morning of Monday the 20th, another shower fell, and the wind went back to the south-west with a falling barometer. In such cases I generally find that rain ensues about midday, or at least when the wind and sun meet in the south-west. But on this occasion it continued blowing strong all the day, and for some time in the night with increased violence. But at last the wind fell, and was succeeded for awhile by heavy rain, thus verifying my anticipations on this particular occasion, and the general theory which I have discussed."

March 29, 1849.

GEORGE RENNIE, Esq., Treasurer, Vice-President, in the Chair.

The following papers were read:—

1. "Examination of the Proximate Principles of some of the Lichens."—Part II. By John Stenhouse, Esq., F.R.S.

Gyrophora pustulata.

The author states that this lichen, which is the "Tripe de Roche" of the Canadian hunters, has been long employed by the manufacturers of archil, though the quantity of colouring matter contained in it is by no means considerable, being little more than a twelfth of that in the *Roccella Montagnei*. The *Gyrophora pustulata*, on which the author operated, was brought from Norway, where it is

annually collected in considerable quantity for the manufacture of archil. The colouring principle was extracted by maceration with milk of lime, and was precipitated in a gelatinous state by neutralizing the lime solution by muriatic acid, precisely in the way so frequently described in the author's former paper (Phil. Trans. 1848). The precipitate was gently dried, and then dissolved in hot spirits of wine. On the cooling of the liquid, the colouring principle was deposited in small soft crystals, which by digestion with animal charcoal and repeated crystallizations were rendered quite colourless. This principle, to which the author has given the name of *Gyrophoric acid*, is almost insoluble in either hot or cold water, and is also much less soluble in hot spirits of wine than either orsellic, erythric, or any of the analogous colouring principles. It is neutral to test-paper, and possesses no saturating power, as the smallest quantity of an alkali gives its solutions an alkaline reaction. Gyrophoric acid strikes a bright red fugitive colour with hypochlorite of lime; and when macerated with a solution of ammonia, it is slowly converted into a purplish-red colouring matter, similar to that yielded by the analogous acids under the same circumstances. When subjected to analysis, the formula of gyrophoric acid was found to be $C_{36}\,H_{18}\,O_{15}$.

Gyrophoric acid when boiled for some hours in alcohol yields an ether similar in appearance and properties to the erythric and lecanoric ethers; its formula is $C_4\,H_5\,O + C_{36}\,H_{18}\,O_{15}$.

Gyrophoric acid unites with the alkalies and metallic oxides, but the compounds which it forms possess little stability and cannot be procured of an uniform composition.

Lecanora tartarea.

This lichen, like the *Gyrophora pustulata*, has been employed from an early period in the manufacture of archil. It is found in considerable abundance in the hilly districts of the northern parts both of Scotland and Ireland. The lichen on which the author operated came from Norway. He found it also to contain gyrophoric acid, in much about the same quantity as the *Gyrophora pustulata*. This fact was established by the analysis of the acid itself and of its ether compound.

Brom-orcine.

In the author's former paper on the proximate principles of the lichens, read before the Royal Society on the 3rd of February 1848, he described a crystalline body obtained by cautiously adding bromine to an aqueous solution of orcine. In this second part he states that, in the 'Comptes Rendus' for August of the same year, Messrs. Laurent and Gerhardt describe the very same compound obtained in precisely the same way, without even hinting that it had been previously discovered. These gentlemen however give a different formula for the compound, viz. $C_{14}\,H_5\,Br_3\,O_4$, or orcine in which three equivalents of hydrogen are replaced by three equivalents of bromine; and the author is disposed to adopt this formula,

as, on repeating the analysis of the compound, he found that he had somewhat over-estimated the amount of bromine contained in it, while its other constituents were determined correctly enough.

Beta-orcine.

This substance, described by the author in the Philosophical Magazine for July 1848, may be obtained from usnic acid, either by destructively distilling it, or by acting on it with alkalies.

Beta-orcine crystallizes very beautifully in four-sided prisms surmounted at either end by four-sided pyramids. These crystals have a brilliant lustre, and are from three quarters of an inch to an inch long. Their solution strikes a fugitive bright-red colour with hypochlorite of lime, and with a solution of ammonia it yields a permanent blood-red colouring matter which becomes darker on standing. The formula of beta-orcine, which however is merely empirical, is $C_{16} H_{10} O_4$.

Quintonitrated erythromannite.

In his former paper on the lichens, the author has described, under the name of *pseudo-orcine*, a remarkably beautiful crystalline body which is obtained by boiling either picro-erythrine, or erythric acid, with an excess of lime or baryta. This substance he then regarded as very analogous to mannite both in its composition and properties, and this view having been amply verified by an experiment which he has recently made, he has been induced to change the name of this compound to *erythro-mannite*, as at once indicating its origin and its most striking properties. After referring to the discovery by Messrs. Flores Domonte and Menard, of "Mannite quintonitrique" or mannite in which five equivalents of water are replaced by five equivalents of nitric acid, and which possesses the remarkable property of detonating so violently when struck by a hammer that M. Sobrero has proposed employing it, instead of fulminate of mercury, in the manufacture of percussion-caps, the author states that when erythro-mannite is treated with fuming nitric acid, in exactly the same way as mannite, it yields a perfectly analogous compound, or erythro-mannite in which five equivalents of water are replaced by five equivalents of nitric acid. This compound, which he has called *quintonitrated erythromannite*, is also insoluble in water, but crystallizes out of hot spirits in large flat crystals resembling those of benzoic acid, only larger and exhibiting a much more pearly lustre. Quintonitrated erythromannite also detonates with great violence when it is mixed with a little dry sand, and is strongly struck with a hammer.

In order to exhibit more distinctly the close analogy which subsists between the four compounds, their rational formulæ are given, viz.

Mannite ..... $= C_{12} H_{14} O_{12}$;
Erythro-mannite ..... $= C_{11} H_{14} O_{11}$;
Quintonitrated mannite ..... $= C_{12} H_9 O_7 + 5NO_5$;
Quintonitrated erythromannite $= C_{11} H_9 O_6 + 5NO_5$.